



WMMG 3545  
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of Jeffrey A. Martin et al.

Art Unit 3643

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Confirmation No. 7937

For OPTIMUM DENSITY TERMITE BAIT COMPOSITION

February 11, 2004

DECLARATION OF RONALD O. RICHARDSON  
UNDER 37 C.F.R. 1.132

COMMISSIONER FOR PATENTS,

SIR:

I, Ronald O. Richardson, hereby declare as follows:

1. I am a resident of Ellisville, Missouri and am employed as Senior Formulations Chemist for Whitmire Micro-Gen Research Laboratories, Inc., the assignee of the above-identified patent application.

2. My educational background and work experience are as follows:

a. I hold an Associate Arts and Science degree that I received in 1972 from Kansas City, Kansas Community College.

b. Currently, and since February 1996, I am employed as a Senior Formulation Chemist at Whitmire Micro-Gen in St. Louis, Missouri. My duties include research and development of formulations for use in the commercial pest control business with emphasis on bait systems. During my employ with Whitmire Micro-Gen, I was awarded U.S. Patent No. 6,416,752.

c. From June 1984 to January 1995, I was employed as a Senior Formulation Chemist at Monsanto Agriculture Group, North America Division in St. Louis, Missouri. My duties included: developing encapsulated herbicides and fungicides using natural gum products and developing dry and liquid package mix

formulations of RoundUp® with additional co-herbicides. I also conceived and developed "Quik Stik" herbicide, a RoundUp® effervescing table for the residential market and developed prototype insecticide and herbicide products based upon effervescing and non-effervescing table technology for the homeowner residential market. In addition, I developed dry RoundUp® products and technology (water soluble and water dispersible) from conception through scaleup and commercialization. I also evaluated and developed water soluble packaging applications and dry flowable safener, Screen WDG milo seed coating safener. During my employ at Monsanto Agriculture Group I was also Formulation Consultant for Packaging Department for water soluble bag applications and was the Monsanto U.S. / Japan Formulation Technology Liaison from 1986 to 1988. During my employ at Monsanto Agriculture I was awarded U.S. Patent Nos. 5,656,572, 5,872,078, 6,051,533 and 6,228,807, Japanese Patent Nos. 03115202 and 05186308 and European Patent No. 0568635.

d. From August 1982 to May 1984, I was employed as a Formulation Chemist/Scientist at Sandoz Crop Protection in Wasco, California. My duties included developing biological crop protection formulations of Thuricide and Teknar (*Bacillus thuringiensis* strains) into dry flowables, dusts, water based flowable and oil based flowable formulations.

e. From November 1972 to June 1982, I was employed as a Formulation Chemist-AG and Specialities at Thompson Hayward Chemical Co in Kansas City, Kansas. My duties included developing: emulsifier systems for various pesticide emulsifiable concentrates; tank mix additives and adjuvants for improved crop spraying applications including low volume aerial application products; pesticide dry flowables, water based flowables and oil based flowables; and surfactant specialty products for the

detergent, oil recovery and industrial chemical industries. I was also responsible for production and scaleup development of dry pesticide formulations, which included insecticides, herbicides, fungicides, baits and animal feeds. I was awarded Canadian Patent No. 1,155,675.

f. In 1997, I chaired and prepared the final report of the Research Communication Improvement Mini-Task Force where key areas for communication improvement among Whitmire researchers were identified and recommendations for improvement were communicated to management and researchers.

g. I have served as Research Safety Committee Representative and prepared the updated draft of the Whitmire Micro-Gen Research Laboratory and Safety Hygiene Plan.

✓ h. In 1985 I successfully completed a short course entitled "ACS Microemulsion and Macroemulsion."

i. From 1986 to 2000, I have attended short courses and symposiums for "Tablet Formulation Technology," "Tablet Manufacturing," "Experimental Design," "Tablet/Granule Coating," "Microencapsulation," "Aerosol Technology," "Patent Law for Managers and Engineers," "GLP Training," "Total Quality Fundamentals," "Managerial Analytics" and "Effective Presentation."

\* 3. Attached hereto is a brochure including photographs Fig. 1 and 3 showing three tablets in a tube or cartridge, such tablets having been prepared in accordance with the invention described and claimed in the above-identified patent application and containing a total of at least 93 grams of a bait composition as defined in claim 1 of the above-identified application. If a non-compacted bait composition were used, it would only require 30 grams to fill the same tube or cartridge. Thus, the present invention maximizes the amount of bait which may be loaded into a

termite bait station by reason of being compacted to an optimum density of not less than approximately 1.033 g/cc.

4. The term "optimum" as used in the specification and claims of the above-identified application is used in its ordinary or normal sense as referring to "best" or "most favorable" and would be so understood by those skilled in the art.

5. The term "purified cellulose" as used in the above-identified application would be understood by those skilled in the art as referring to cellulose subjected to hydrolysis and purification and differing from microcrystalline cellulose. Attached hereto is a copy of a brochure published by FMC, a supplier of microcrystalline cellulose and purified cellulose under the trademarks AVICEL, LATTICE and NILYN. Those skilled in the art are familiar with the terminology "microcrystalline cellulose" and "purified cellulose."

6. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date 2-12-04

Ronald O. Richardson  
Ronald O. Richardson

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# ADVANCE<sup>TM</sup>

## Termite Bait System

The best long-term protection for  
your most valuable investments.

# Termites: Your home's worst enemy.

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Every day America's homes are targeted by a dangerous predator that causes thousands of dollars worth of damage – subterranean termites. And often, there's no evidence of their presence until it's too late. These termites live in underground colonies and work 24 hours a day to destroy your home from the inside out.

What do termites look like?

Termites are often mistaken for flying ants, but there are noticeable differences:

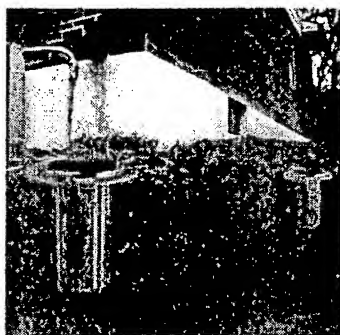
- Termite wings tend to be equal in size while ant wings are usually longer in front and shorter in back.
- Ants' antennae are elbowed, while termites' are straight.
- Ants have a narrow, pinched waist, while termites' waists are thicker and less defined.



How can termites enter my home?

Termites can enter homes with just  $\frac{1}{32}$ -of-an-inch opening. In addition:

- Termites follow tree roots and construction conduits such as pipes and footers to gain entry into homes.
- Termites constantly forage and evaluate the size and quality of food resources as they seek out cellulose.
- Termites can be in your home for several years with very few signs of activity.
- Advance Termite Bait System can intercept colonies before they reach your home.



**It is recommended that a professional inspect your home to identify the presence of termites.**



How can you tell if they are present in or near your home? Unfortunately, there may be no warning signs but look for these:

- Termites "swarming" during the day and often after rainfall.
- Termite evidence in or around windows and doorframes.
- "Mud tunnels", appearing on or around the foundation.
- Baseboards and floors which may sound hollow.
- Dead termites or termite wings on window sills or along walls.

Most importantly, call a licensed and trained pest management professional who can inspect your home and assess what level of termite protection is needed.

How much damage can termites do to your home?

Termites cause nearly \$2-billion in damage annually according to research. Unfortunately, without annual inspections, termites can go unnoticed for years while continuing to damage your home. In addition:

- Most homeowner policies do not cover termite damage.
- Termites cause damage in hidden areas, behind walls, in crawl spaces and basements.
- Many pest management professionals offer annual inspection services and treatment guarantees.
- The best solution to potentially avoid termite damage is a professional, thorough annual inspection and a termite bait system to detect termite populations and eliminate them around your home.





# The Advance Termite Bait System: Proven security for your home.

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The revolutionary Advance Termite Bait System eliminates termite colonies in and around your home and offers advantages to your family with long-term protection of your biggest investment — your home.

## Low profile

Sits at soil level, which minimizes visibility of the stations and interference with lawn mowers and children.

## Quick-Lock™ cap

Designed to minimize tampering by children and pets.

## Active ingredient

Eliminates termite colonies in and around your home.

## Largest containerized bait

Ensures that enough bait is present to eliminate a termite colony around your home. Plus, the bait is compressed to deliver maximum killing power in less space.

## Ultra low disturbance

The key to eliminating termites is minimizing disturbance with our dual-stage station design.

**ADVANCE™**  
Termite Bait System

## How does the bait system work?

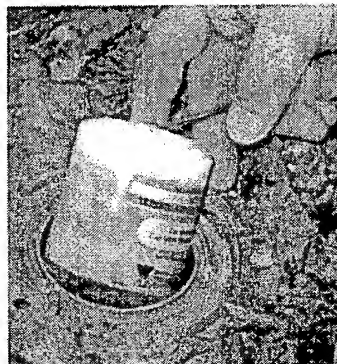


Fig. 1

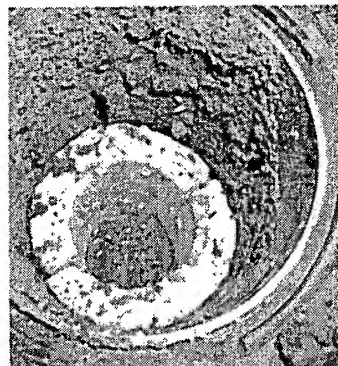


Fig. 2

- First, a pest management professional will inspect your home for termites and if they are found or if your risk is high, the AdvanceTermite Bait System will be installed in soil around the perimeter of your home.
- The stations will be checked regularly for termite activity. (Fig. 1)
- When termites are found in a station, (Fig. 2) the Termite Inspection Cartridge (TIC), containing no active ingredient, is replaced with a termite bait cartridge so termites can start feeding on the bait. (Fig. 3)
- As termites feed and then travel back to the colony, they share termite bait with other nestmates (trophallaxis) and send other termites back to feed on the bait. As feeding on the bait continues and more and more termites are affected, the termite colony starts to die and is eliminated.
- After a colony is eliminated, the bait is replaced with new monitoring cartridges. Your pest management professional will continue to inspect these regularly to discover and treat new colonies that might invade your property. (Fig. 4)



Fig. 3

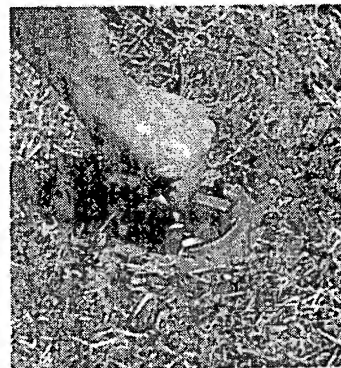


Fig. 4



# Why choose Advance Termite Bait System as your primary termite protection?

## KEY ISSUE

## ADVANCE TERMITE BAIT SYSTEM

## LIQUID TREATMENT

Treatment Convenience/  
Invasiveness to Home

Install stations only on outside  
of home.

Must drill foundation in most cases  
and work inside home (treatments  
take 4-8 hours or longer).

Area of Application

Bait station is placed below  
ground and is opened by a special  
tool - no odors.

Applied in liquid form of  
100-200 gallons around home  
and underneath slab areas inside  
of home. May need to leave home  
during treatment.

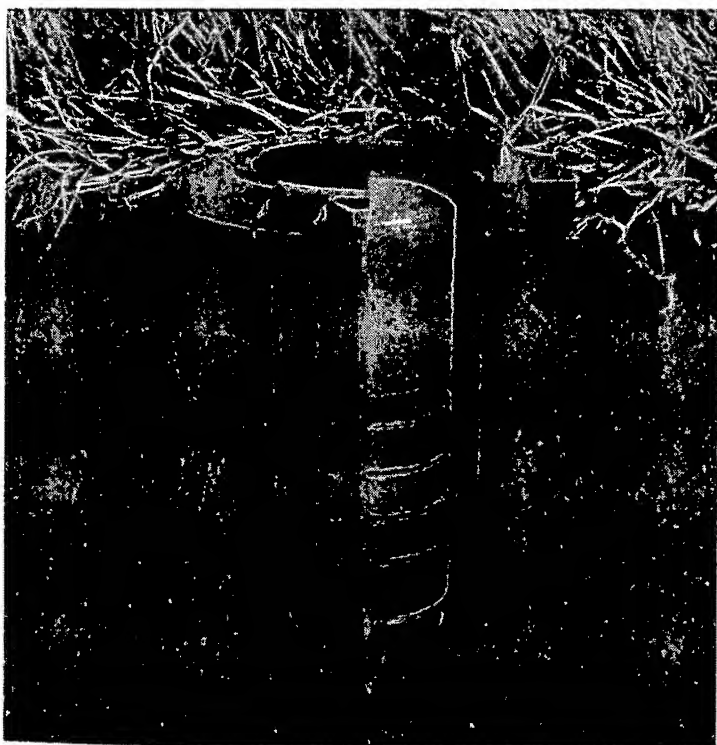
Colony Elimination

Kills the termite colony and  
continues to monitor for new  
invading colonies for long-term  
protection of your home.

Kills termites that enter the treated  
area. Length of protection will vary by  
product. May need another treatment  
in 5-7 years.

Why choose Advance Termite Bait System over other baits?

- System designed as a second-generation station based on input from universities and pest management professionals.
- Offers a major advance in termite baiting technology via a two stage process that features an ultra low disturbance design to pattern termite's natural feeding behavior, leading to enhanced colony elimination.
- The largest containerized bait load allows for maximum bait to be fed to the colony in a shorter time to eliminate your termite colony faster, giving you peace of mind.



Liquid Treatment Installation



Drilling



Liquid Applied Around Home

Less Intrusive Bait System



Soil Removed



Station Placement

**ADVANCE™**  
**Termite Bait System**

Additional system features:

- The bait system features stations that are opened by a special tool.
- The active ingredient of the Advance Termite Bait System is securely contained in a cartridge below ground.
- The active ingredient has extremely low toxicity to pets and humans (based on EPA classification of toxicity categories).
- Low profile station reduces risk of mowing or tripping hazard.



Ask your pest management professional about the Advance Termite Bait System advantages.

For complete details on all the benefits and protection the Advance Termite Bait System can provide your home, call your pest management professional today. It's the best long-term protection of your biggest investment – your family's home.

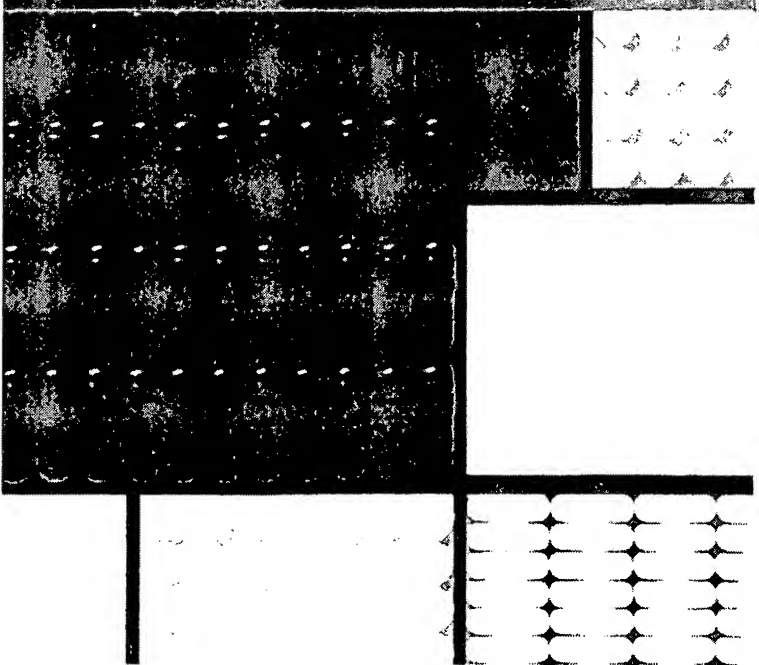
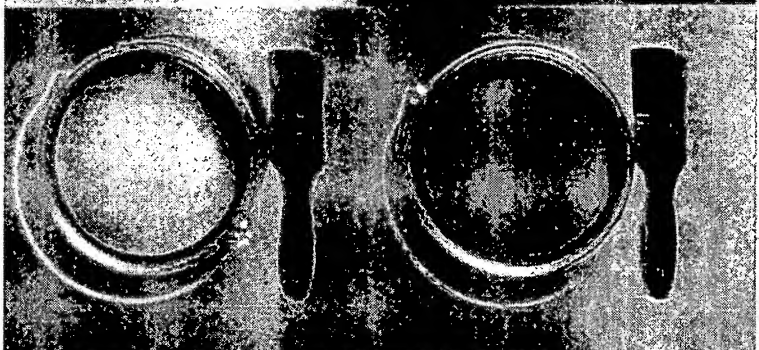
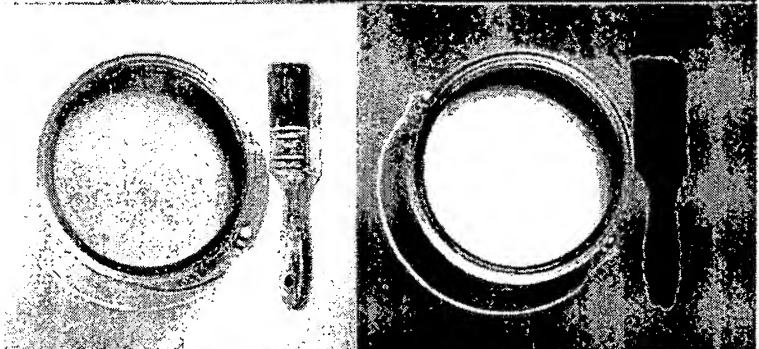
**ADVANCE™**  
Termite Bait System



# FMC Microcrystalline Cellulose/Cellulose Gel General Technology

## The Avicel Family

- AVICEL<sup>®</sup>
- AVICEL-PLUS<sup>®</sup>
- LATTICE<sup>®</sup>
- NILYN<sup>®</sup>
- NOVAGEL<sup>®</sup>

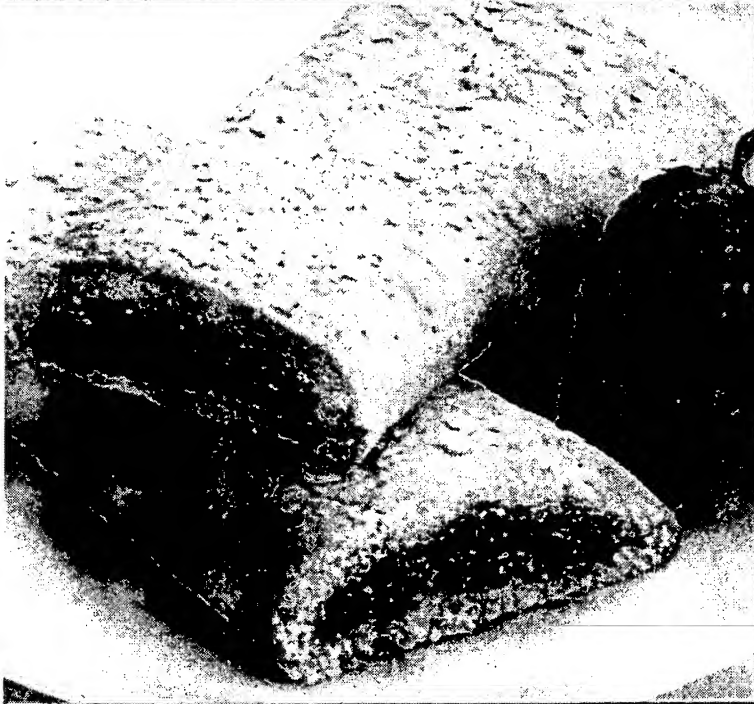
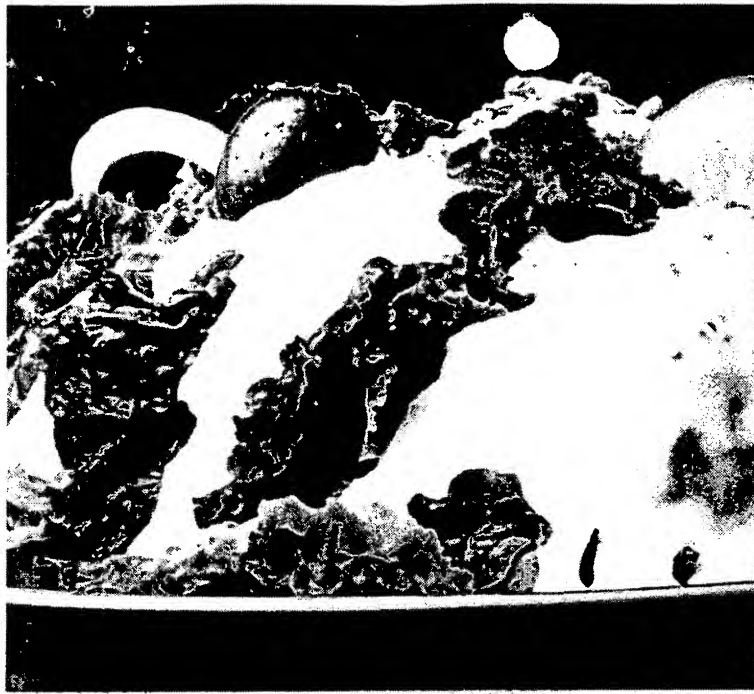


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**FMC** BioPolymer

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Not Just Products. Partners.





# Mastering the Art of Innovative Thinking

With over 35 years of experience in the development and production of microcrystalline cellulose (cellulose gel) products, FMC BioPolymer is well prepared to serve you as a resourceful and reliable partner.

Working with a broad palette of microcrystalline cellulose and an even broader range of problem-solving skills, FMC BioPolymer can help you master the art of adding structure, texture and stabilization.

Our high quality microcrystalline cellulose is manufactured under the stringent requirements of ISO certification. And the customer service we provide, both before and after the sale, adds great value to our products. You can rely on us for the sound advice, formulation expertise, and processing problem-solving that can help you reach new levels of efficiency in your operation. You can also count on our family of Avicel® products—Avicel®, Avicel-plus®, CL 611™, Lattice®, Nilyn® and Novagel® to help turn your innovative thinking into practical, profitable reality.

*FMC BioPolymer. Adding structure, texture and stability—naturally.*

FMC BioPolymer uses the terms microcrystalline cellulose (MCC) and cellulose gel interchangeably when referring to finished products. To simplify the content of this brochure, we will use the term MCC throughout.

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# An Introduction to Avicel® Microcrystalline Cellulose

Avicel microcrystalline cellulose (MCC) is a unique ingredient. In water, with shear, MCC forms a three-dimensional matrix comprised of millions of insoluble microcrystals that form an extremely stable, thixotropic gel. Avicel microcrystalline cellulose functions at any temperature and provides superior freeze/thaw and heat stability to finished products.

All FMC BioPolymer manufacturing facilities maintain ISO certification on a global basis. ISO certification, along with a rigorous QA/QC program, assures highest quality products and functionality with every delivery.

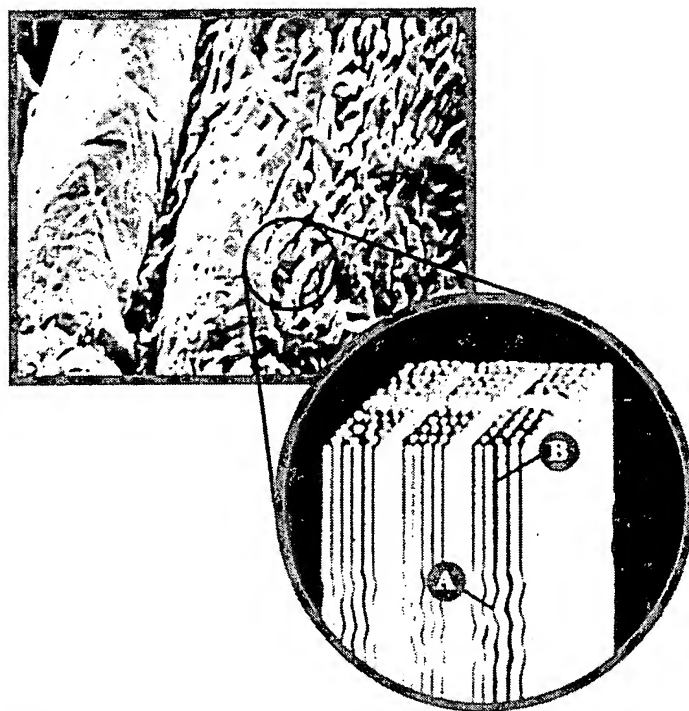
More than 35 years ago FMC BioPolymer introduced Avicel MCC to the food, pharmaceutical and specialty industries. We continue to maintain a leadership position within the markets we serve by improving on existing technology and creating revolutionary breakthroughs that offer our customers even greater functionality.

FMC BioPolymer builds quality and performance into its family of Avicel products at three levels — raw material sourcing, the manufacture of Avicel, and tailoring the functional properties of each product. Today's Avicel product line has evolved into a family of highly functional products that offer optimum functionality to the food, specialty and pharmaceutical industries. FMC BioPolymer markets its Avicel products under five well-established trade names: Avicel, Avicel-plus® and Novagel® are primarily designed to meet the needs of the food industry. The Lattice® and Nilyn® products are designed to meet the needs of the specialty (non-foods) industry.

## Manufacturing

Microcrystalline cellulose (MCC) is derived from naturally occurring cellulose similar to that found in fruits and vegetables. From this natural source, FMC BioPolymer develops and customizes Avicel products, through various unique co-processing techniques. These help us standardize products to meet specific viscosity, gelling, suspension and stabilizing properties.

The raw material for Avicel is purified plant fiber, or alpha cellulose, and it is composed of millions of microfibrils. Each microfibril is composed of two areas (**Figure 1**).



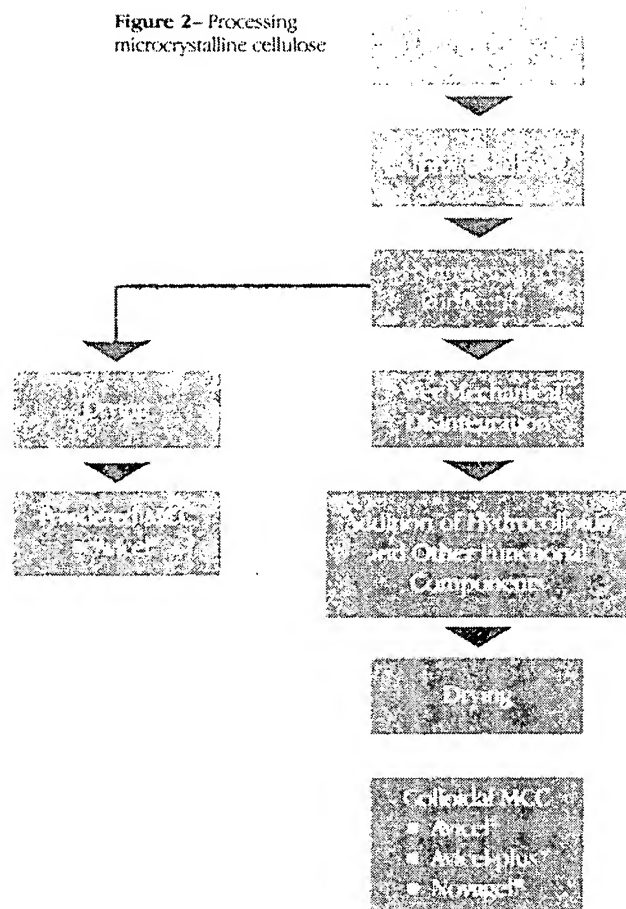
**Figure 1**

A. The **paracrystalline region**, an amorphous flexible mass of cellulose chains, and  
B. The **crystalline region**, which is composed of tight **bundles of microfibrils** in a rigid linear arrangement.

During processing, the fibrous material is hydrolyzed (depolymerized) to remove the amorphous regions, leaving only the crystalline bundles. The resulting cellulose gel can be processed by two methods, to produce either Avicel powdered or Avicel colloidal MCC (see **Figure 2**, next page).



Figure 2—Processing microcrystalline cellulose



## Powdered Grades

Drying the crystalline bundles results in aggregates of very porous particles, which are 100% MCC. This porosity allows the particles to absorb large amounts of water or oil onto the surface.

**Powdered grades of Avicel MCC are ideally suited as:**

- Source of dietary fiber
- Non-caloric bulking agents
- Opacifiers
- Carriers
- Anti-caking agents
- Extrusion aids
- Tableting aids

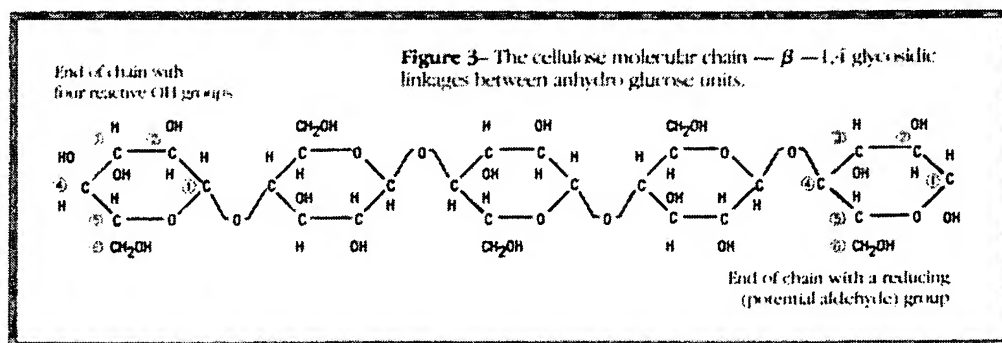
## Colloidal Grades

Avicel® colloidal MCC is processed by wet mechanical disintegration (attrition) which breaks up the cellulose aggregates to release the microcrystals. Traditionally, the microcrystals are then co-processed with a hydrophilic barrier dispersant, to keep the microcrystals from reaggregating during the drying process. The dispersants used have included water soluble hydrocolloids such as carboxymethylcellulose, alginate or xanthan gum.

The unique functional properties of fully dispersed Avicel colloidal MCC will greatly improve the mouthfeel and impart or enhance fat-like properties in food products. It also imparts emulsion stability, opacity and suspension in a variety of products.

The family of Avicel products began to evolve in the late 1980s and early 1990s, when FMC BioPolymer patented its process of producing Novagel® MCC. The Novagel MCC line of products consists of MCC and guar. They mimic the rheological properties of fat and provide exceptional fat-like eating qualities in processed foods.

More recently, FMC BioPolymer has perfected processing technology that allows the microcrystals to be co-dried with other functional ingredients, such as calcium and surfactants. These Avicel-plus® products are unlike the traditional Avicel MCC in that they offer other unique properties, such as improved rheological properties, minimal viscosity with excellent suspension, calcium fortification, enhanced sensory properties and positive modification in the overall flavor profile of the finished product. These properties can be further enhanced with the use of a traditional Avicel MCC or other stabilizer or emulsifier.



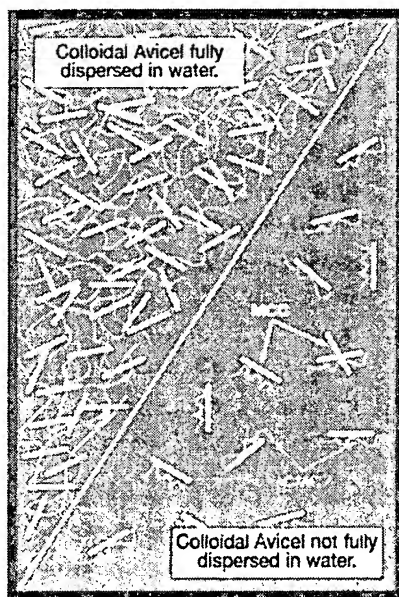
# Colloidal Grades

Avicel® colloidal MCC is either bulk-dried or spray-dried, to form distinct microcrystalline particles. The functionality of colloidal Avicel MCC is due to the properties imparted by these particles when properly dispersed in water or a liquid medium.

## Traditional Avicel Colloidal MCC: Properties and Functionality

Properly dispersed Avicel colloidal MCC sets up into a 3-dimensional network of these colloidal particles which imparts stability in the finished product; the system is held together by weak hydrogen bonding.

The Avicel dispersion chemically binds water to a much lesser extent than soluble hydrocolloids (although some water is bound to the soluble hydrocolloid associated with Avicel, e.g. CMC), as shown in **Figure 4**. The formation of this insoluble 3-dimensional matrix creates a physical network that affects the movement of moisture and gives the colloidal grades of MCC their functional properties.



**Figure 4**

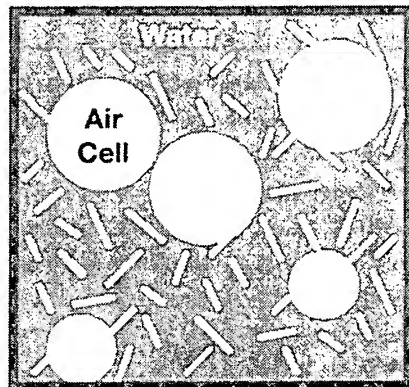
# The Functional Properties of MCC

The gel network formed with Avicel colloidal MCC offers the following properties:

**Thixotropy**— gels made with Avicel colloidal MCC readily break down with shear; when the shear is removed, the gel will reform over time with minimal loss to viscosity.

**Foam Stability**— Avicel MCC is a premier foam stabilizer. The microcrystalline network thickens the water phase between air cells and acts as a physical barrier to maintain the air cells in suspension. Although Avicel MCC does not have significant film forming properties, it does work to increase the film strength

(**Figures 5A & B**).

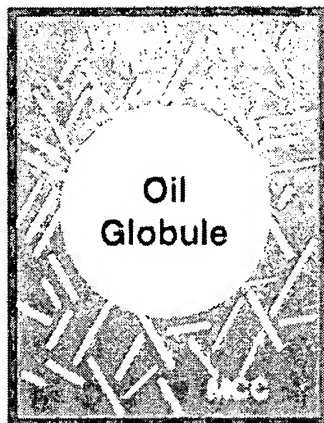


**Figure 5A—**  
Avicel MCC locates  
in aqueous phase  
and increases  
film strength.

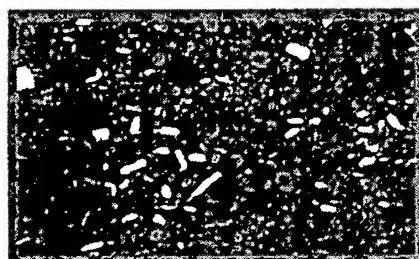


**Figure 5B—**  
Stabilizes foam

**Stabilize Emulsions**— Avicel® MCC forms a colloidal network of particles when properly dispersed in water. This colloidal network sets up at the oil-water interface to physically prevent the oil globules from coalescing (Figures 6 and 7). Hence the Avicel acts to stabilize the emulsion as well as thicken the water phase to improve clinging properties.



**Figure 6**— Representation of 3-dimensional structure formed with Avicel MCC



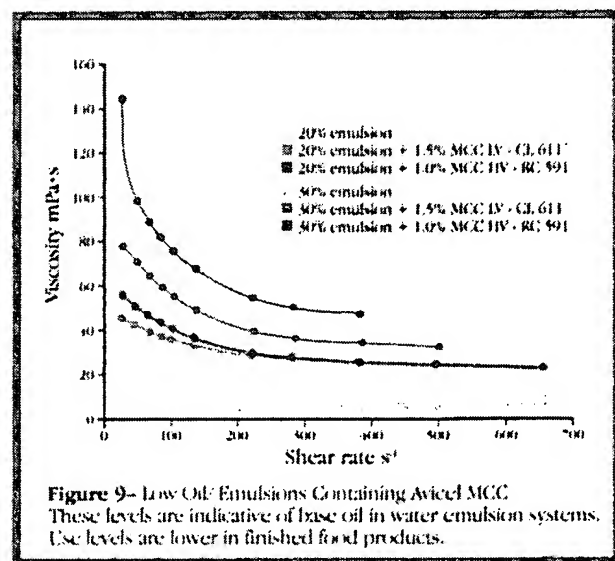
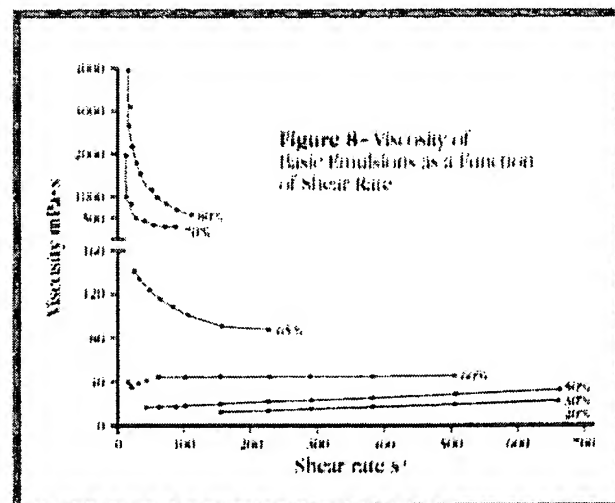
**Figure 7**— Avicel MCC stabilizes emulsions for added shelf-life

**Heat Stability**— temperature changes have little or no effect on the functionality and viscosity of Avicel dispersions. This property is extremely important in the preparation of heat stable products, particularly when acids are present. Avicel MCC will hold up during heat processing, including baking, retorting, UHT processing and microwave heating with minimal loss in viscosity.

**Shorten Textures**— Avicel MCC can be used to modify textures— it can shorten textures or add body without creating a gummy or pasty texture. In food systems this quality results in a cleaner mouthfeel and excellent flavor release.

**Suspend Particles**— the stability and thixotropic rheology of Avicel MCC makes it a useful suspension aid. In an aqueous system, the 3-dimensional matrix sets-up at low use levels to effectively suspend particulates.

**Replace Fats and Oils**— Avicel MCC can be used to replace some or all of the oil in emulsion type products. The Avicel mimics many of the rheological properties associated with full oil emulsions (Figures 8 and 9).



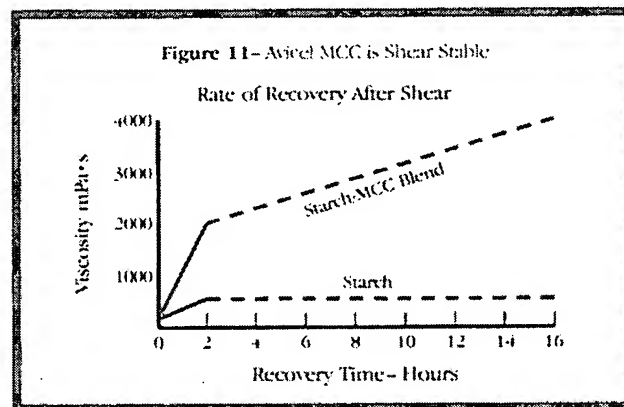
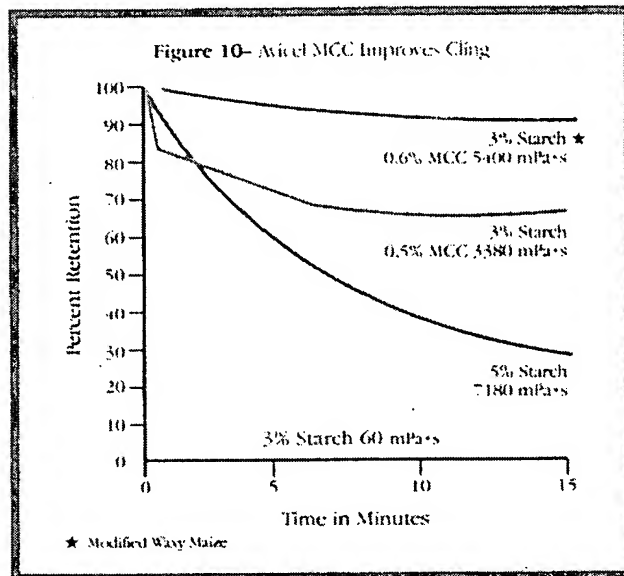
**Control Ice Crystal Growth**— the 3-dimensional matrix created with dispersed Avicel colloidal MCC and the surface area of the microcrystals create a stabilizing system that maintains a homogeneous state during freeze/thaw cycles. Avicel helps prevent moisture migration and inhibits the aggregation of protein and other solids. The 3-dimensional network formed with Avicel is extremely effective in maintaining the three-phase system of water/fat/air.

# Nutritional Benefits

**Extend Starches**— using a ratio of 4 parts starch/1 part

Avicel® MCC allows processors to reduce the amount of starch thickener required by as much as 25%. The MCC will also improve heat and shear stability over prolonged process cycles.

(Figures 10 and 11)



**Opacity**— insoluble cellulose crystallites act as opacifiers and can add whiteness to products.

Avicel microcrystalline cellulose is a good source of dietary fiber, yet contributes no, or very little calories in food systems. Some colloidal grades provide caloric content due to the soluble hydrocolloids used during co-processing with the MCC.

MCC is virtually inert and will not interfere or interact with other nutrients added to the foods for fortification, such as vitamins and minerals. Actually, Avicel MCC is an excellent suspending agent and can provide stable suspension of even very heavy particulates like ferrous fumarate or other minerals.

Some newer grades, trademarked Avicel-plus® microcrystalline cellulose, are uniquely co-processed with calcium to offer enhanced calcium content in nutritionally fortified foods and beverages.

## Typical Nutritional Content of Avicel Microcrystalline Cellulose (per 100 grams):

| Parameter             | Colloidal Avicel | Powdered Avicel |
|-----------------------|------------------|-----------------|
| Total Calories        | 20 cal           | 0 cal           |
| Total Fat             | 0                | 0               |
| Total Dietary Fiber   | 93 g             | 98 g            |
| Soluble Dietary Fiber | 5 g              | 0 g             |
| Sugar                 | ND*              | ND              |
| Protein               | ND               | ND              |
| Vitamin A             | ND               | ND              |
| Vitamin C             | ND               | ND              |
| Sodium                | 934 mg           | 4 mg            |
| Iron                  | 0.5 mg           | 0.24 mg         |
| Calcium               | 2.0 mg           | 0.1 mg          |
| Ash                   | 2 g              | 1 g             |

\* ND = Not Detectable

Note: These are typical values. Values may vary slightly when analysis are performed in other laboratories.

# Proper Dispersion of Avicel Colloidal MCC

Proper dispersion of Avicel colloidal MCC is the key to obtaining optimum functionality. As Avicel is dispersed in water with appropriate shear, the hydrophilic portion is hydrated. This allows the cellulose microcrystals to be released and activated, resulting in a stable colloidal network. Critical factors to consider when dispersing the remaining ingredients include:

**Order of Addition**— Avicel MCC should ideally be hydrated in water **before** other ingredients are added. Avicel does not chemically bind water and will not interfere with the subsequent addition of the remaining ingredients.

**Type of Shear**— the grade or type of Avicel MCC you select depends on the amount of shear available in your process.

**pH of Systems**— a protective colloid is recommended to prevent flocculation if the pH of your system is less than 3.8. Suggested protective colloids are xanthan gum, carboxymethylcellulose and methylcellulose. The protective colloid is generally used at 10% of the microcrystalline cellulose level.

**Hard Water/Electrolytes**— a high level of electrolytes present in the system before the addition of Avicel MCC may inhibit proper dispersion and require higher shear for good activation.

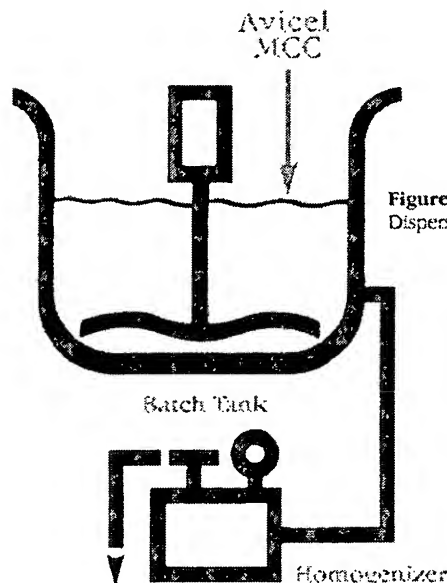
## Methods of Dispersion



**Figure 12—**  
Dispersion in Water

Batch Tank  
with High Speed Mixer

- Add Avicel MCC to water while agitating
- Add protective colloid if pH of system is less than 3.8
- Agitate in a high speed mixer for 5 to 15 minutes (length of dispersion time is dependent on the equipment)
- Add the other ingredients
- Hold the salts and acids until last



**Figure 13—**  
Dispersion in Milk

Batch Tank

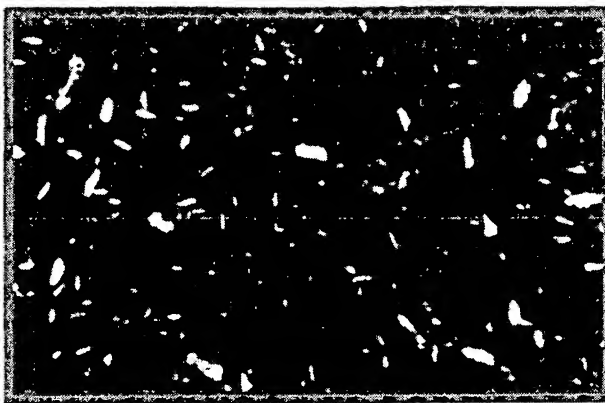
Homogenizer

## Homogenization

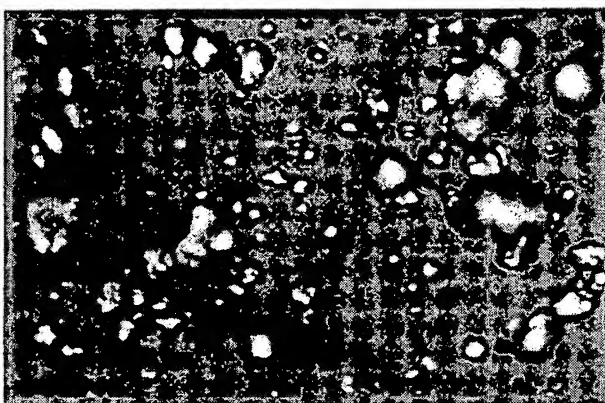
- Follow steps as for water dispersion (above)
- Best to use homogenization at greater than 100 bar pressure (2000 psi)

# Checking Your Dispersion of Avicel® Colloidal MCC

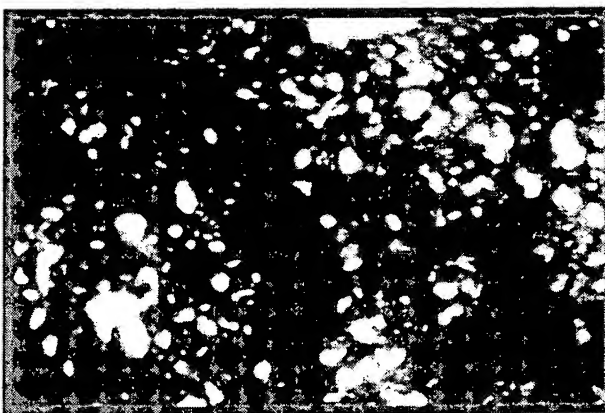
A polarized microscope will allow you to see if your microcrystalline cellulose is properly dispersed. Full functionality is only obtained after proper dispersion (see **Figures 14, 15 and 16**).



**Figure 14–** Fully Dispersed 100x Polarized Light  
Dispersed Avicel MCC appears as an even, crystalline pattern under polarized light.



**Figure 15–** Undispersed 100x Polarized Light  
Undispersed Avicel MCC appears as aggregates of powder.



**Figure 16–** Flocculated 100x Polarized Light  
Flocculated Avicel MCC will have areas with gaps, where no microcrystals are present.



# Main Applications, Functions and Benefits

The combination of properties discussed in this brochure allows Avicel® MCC to function in a variety of systems, as summarized below.

## FOOD SYSTEMS

| Application                    | Type of Avicel MCC    | Functions and Benefits  |
|--------------------------------|-----------------------|---|
| <b>Bar Mixes</b>               | Colloidal             | ▪ Adds creaminess and pulpiness; stabilizes emulsion; suspends solids; adds opacity   |
| <b>Batters &amp; Breadings</b> | Colloidal             | ▪ Improves cling; reduces drying time; reduces fat absorption during frying; reduces sogginess if finished product stored under heat lamps                      |
| <b>Chocolate Drinks</b>        | Colloidal             | ▪ Adds creaminess; suspends solids; stable under high temperature processing; adds opacity  |
| <b>Confections</b>             | Powdered              | ▪ Controls moisture absorption; non-nutritive bulk filler   |
| <b>Dressings</b>               | Colloidal             | ▪ Enhances the mouthfeel characteristics; mimics the mouthfeel of oil; stabilizes emulsions; suspends solids; improves cling; opacifier                         |
| <b>Fillings</b>                | Colloidal             | ▪ Prevents boil-out; improves texture and flavor release  |
| <b>Food Service</b>            | Colloidal             | ▪ Stabilizes microwave sauces; reduces skinning on sauces held on steam table; helps keep fried foods crisp under heat lamps; reduces fat pick up during frying |
| <b>High Fiber Drinks</b>       | Powdered or Colloidal | ▪ Increases dietary fiber; adds body and creaminess; suspends solids  |
| <b>Icings</b>                  | Colloidal             | ▪ Controls flow and moisture migration; imparts stability; increases creaminess   |
| <b>Lowfat Sour Cream</b>       | Colloidal             | ▪ Imparts full-fat mouthfeel; stabilizes the system   |
| <b>Puffed Snacks</b>           | Powdered              | ▪ Aids in extrusion process; increases uniformity; promotes finer air cell structure  |
| <b>Sauces</b>                  | Colloidal             | ▪ Shear stability allows pumping without viscosity loss; stabilizes emulsions; improves cling; adds body and creaminess; prevents boil-out; adds opacity        |
| <b>Whipped Toppings</b>        | Colloidal             | ▪ Foam stabilizer   |

## NON-FOOD SYSTEMS

| Application             | Type of Avicel MCC        | Functions and Benefits  |
|-------------------------|---------------------------|---|
| <b>Tablets/Granules</b> | Cross-linked or Colloidal | ▪ Accelerates disintegration and dispersion; excellent binder for tablets, granules or any compacted material; superior stability; consistent and reproducible flow rate; good water uptake |

### Regulatory

Ingredients in Avicel® microcrystalline cellulose and cellulose gel are generally recognized as safe (GRAS) by experts in accordance with food and drug regulations.

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### Technical Service

The information contained in this bulletin is intended to be general in nature. Techniques and data pertaining to specific uses for FMC ingredients and new developments will be published periodically in the form of supplemental application bulletins.

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